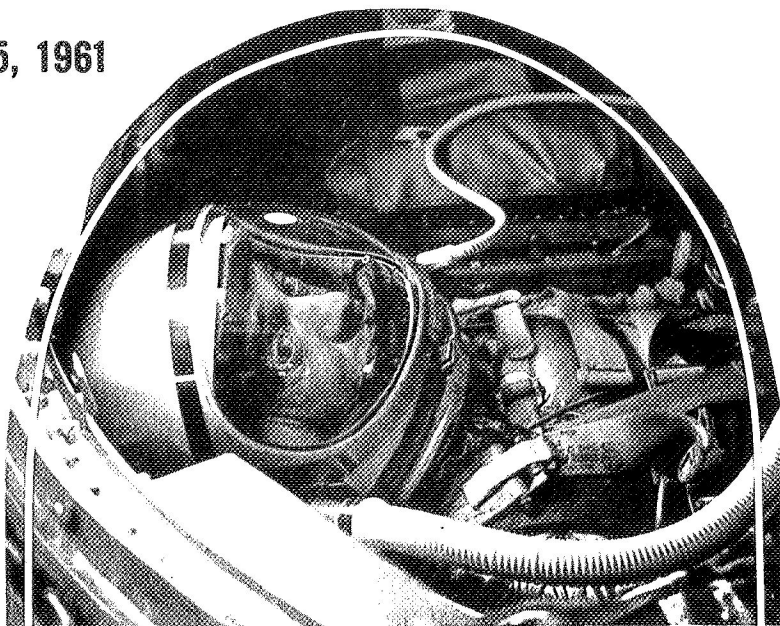
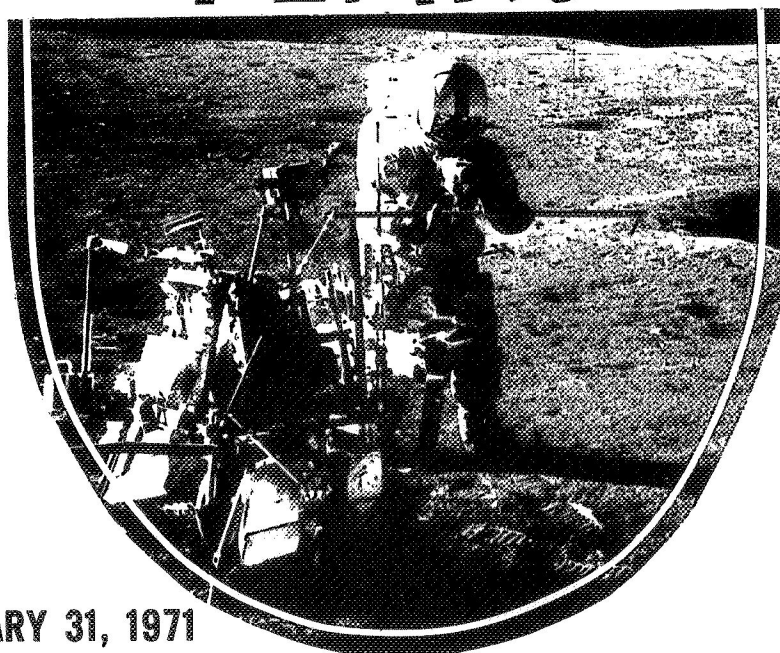


MAY 5, 1961



YEARS



JANUARY 31, 1971

# U.S. MANNED SPACE FLIGHT

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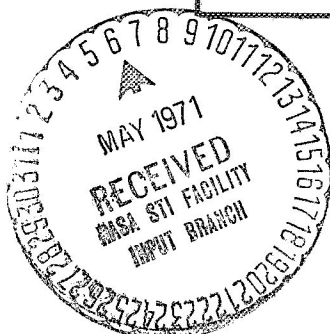
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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10TH ANNIVERSARY OF U.S. MANNED SPACE FLIGHT

On Friday morning, May 5, 1961, more than 2,000 sailors in their dress white uniforms lined the decks of the aircraft carrier, USS Lake Champlain, stationed in the Atlantic Ocean about 300 miles off the Florida coast. The weather was perfect, clear skies and a calm sea. Those on board reported there was complete silence as all eyes were peering into the sky.

Suddenly a bright orange object appeared 10,000 feet overhead and the thousands of voices shouted in unison as they watched the first United States manned spacecraft parachute back to Earth. Just 11 minutes after impact, Astronaut Alan B. Shepard, Jr., and his Freedom 7 Mercury spacecraft were on the carrier deck after a 15-minute flight from Cape Canaveral.

At the launch site 580 news correspondents had watched the Redstone rocket launch Freedom 7. An estimated 45 million people saw the event on television and millions more heard it reported over worldwide radio networks. The world had just witnessed the first of 24 United States manned space missions conducted by the National Aeronautics and Space Administration.

Shepard's suborbital flight demonstrated the engineering concepts of the Project Mercury space vehicle system. It protected man during the stresses of rocket powered launch and reentry to Earth. Shepard also reported no disorientation during five minutes of weightlessness.

Three months prior to the 10th anniversary of the Freedom 7 mission, Shepard commanded the 24th American manned space mission, Apollo 14. This third lunar landing flight was launched Jan. 31, 1971. He spent nine days in space, including more than nine hours exploring the Moon's surface.

-more-

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In retrospect, Project Mercury, the first United States manned flight program, had been initiated Oct. 7, 1958. This venture to launch a man into Earth orbit and return him safely was undertaken to carry out objectives set forth in the National Aeronautics and Space Act of 1958. Three of these objectives are: to contribute to the expansion of human knowledge of phenomena in the atmosphere and space; development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space; and preservation of the role of the United States as a leader in space.

The success of Freedom 7 gave Project Mercury officials assurance that an orbital flight could be undertaken in a short time. It also inspired the President, who requested NASA to recommend a plan for future manned space flights.

On May 25, 25 days after President John F. Kennedy had presented the NASA Distinguished Service Medal to Shepard at the White House, he addressed a joint session of the United States Congress and said, "I believe this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to Earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish."

Congress endorsed this goal, and that summer NASA began to marshal the government-industry-university personnel and facilities to accomplish the task.

A second suborbital flight by Virgil I. "Gus" Grissom on July 21, 1961, confirmed Shepard's success. The Project Mercury objective was achieved Feb. 20, 1962, when John H. Glenn, Jr., completed a three-orbit mission.

The succeeding Mercury missions later that year and the final flight in 1963 demonstrated that man could survive in weightlessness and operate efficiently as a pilot-engineer-experimenter for as long as 34 hours.

In 1961 and 1962 more than a million man-hours of engineering studies were undertaken before final decisions were made on precisely how the Moon landing would be carried out. Project Apollo -- a three-module spacecraft to carry three astronauts around the Moon -- had been presented to industry in 1960. The launch vehicle would employ clustered rocket engines with high-energy upper stages.

Early in the studies it was determined that rendezvous and docking of spacecraft and Saturn launch vehicles would be employed in a lunar landing mission of about 10 days.

In December, 1961, the Gemini program was announced to explore space for up to two weeks and to perfect operational techniques required for the Apollo lunar landing. The Gemini spacecraft would carry a two-man crew.

Two unmanned test flights preceded 10 manned missions during 1965 and 1966. Flights of four, eight and 14 days confirmed, from a medical viewpoint, that man could fly a lunar mission. Astronauts demonstrated in more than 12 hours of extra-vehicular activity (EVA) that work could be performed outside of a spacecraft. In addition, 52 different scientific and technical experiments were conducted in flight.

Gemini proved that man could operate effectively in space, respond to the unexpected and execute alternate and contingency plans when necessary. Also, the NASA flight operations teams, supported by the Department of Defense recovery forces and the U.S. Weather Bureau, developed the ability to meet unexpected situations quickly.

While Mercury and Gemini were being completed, the Apollo industrial teams were selected to develop the spacecraft and Saturn launch vehicles. The facilities to test and launch the Apollo system were constructed. At the peak, 300,000 personnel and 20,000 business firms participated.

The first manned Apollo Earth orbital mission was to be launched in February 1967, when a spacecraft fire took the lives of astronauts Virgil "Gus" Grissom, Edward H. White, II and Roger B. Chaffee, Jan. 27 during a pre-launch test. An investigation of the accident and review of the program produced an improved spacecraft, and safety operational procedures were tightened. Successful unmanned flight testing which qualified all segments of the spacecraft and Saturn V for manned operations continued late in 1967 and 1968.

The first Earth orbital manned mission was in October 1968. Two months later the Apollo 8 lunar orbit mission at Christmas demonstrated that man had developed a system to escape Earth orbit, navigate in lunar orbit and return safely.

Two additional missions, Apollo 9 and 10 early in 1969, completed preparations for landing on the Moon.

On July 16, 1969, Apollo 11 was launched. At the Kennedy Space Center press site and Apollo news center at Houston, 3,497 news correspondents reported the story to the world. Four and a half days later the Eagle (the lunar module) landed and the world watched as Neil Armstrong descended to the surface and said, "That's one small step for a man, one giant leap for mankind."

The succeeding missions, Apollo 12 in November, 1969, and Apollo 14 early this year yielded vast amounts of additional scientific data.

Apollo 13 failed to execute its landing on the Moon because of an oxygen tank rupture in the spacecraft. The safe return of the crew, however, again demonstrated the Apollo team's ability to react immediately to the unexpected and to devise successfully procedures to meet a serious emergency in flight.

The 10 years of progress can be visualized by comparing Shepard's Mercury and Apollo missions. The Mercury-Redstone rocket produced 78,000 pounds thrust, while the Apollo Saturn V, the world's most powerful rocket, produces 7.5 million pounds thrust in the first stage, 1.6 million pounds in the second and 200,000 in its third stage. The 100,000 pound Apollo spacecraft outweighed the combined Mercury spacecraft and Redstone by 15 tons.

Accomplishments of the decade include 24 manned space missions of Mercury, Gemini and Apollo in which 28 astronauts have accumulated 6,919 man-hours in space. The spacecraft have traveled approximately 32 million miles. Approximately 40 man-hours have been spent on the lunar surface by six astronauts who deployed 18 geophysical instruments on the Moon and returned 216 pounds of lunar rock and soil to Earth.

The achievements and failures have been carried out before the eyes of the world. About 200 teams of scientists from universities, government and private organizations in 30 states within the United States, the Virgin Islands and 18 other countries are analyzing the lunar surface material and geophysical data transmitted back to Earth.

An agreement reached between the National Aeronautics and Space Administration and the Academy of Sciences of the USSR on October 29, 1970 sets forth procedures and a schedule for joint efforts to design compatible docking and rendezvous arrangements. Another agreement provides for initiating an exchange of lunar samples obtained by the two countries and establishes procedures to produce recommendations for joint consideration of the objectives and results of space research, the improvement of existing weather data exchanges, research with meteorological rockets, techniques for studying the natural environment and the expanded exchange of data on space biology and medicine.

Some of the findings thus far are:

-- No evidence of water or life.

-- Ages of rocks and soil returned range from 3.3 to 4.6 billion years. The age of the Earth is generally accepted as 4.6 billion years. None of Earth's rocks have been found to be older than 3.5 billion years, and few have been found more than 50 million years old because of destruction and covering by erosion and other processes.

-- Lunar rocks have produced new evidence on the question about the formation of granite. Other data noted first in lunar rocks have now been observed in Earth rocks.

-- Lunar surface material has fallen into three categories: (1) igneous rocks, solidified after melting; (2) breccia, chunks of rock and soil cemented together by temperature and pressure, and (3) fines, small fragments of material. The rocks are similar to those found on Earth but have different chemical compositions.

-- The seismometers have recorded that numerous moonquakes occur about the time the Moon is closest to Earth during its monthly cycle.

-- Seismic signals imply that the Moon lacks processes such as mountain building and continental drift on the Earth.

-- Magnetic fields have been detected on the Moon which are stronger than expected but much less than that of Earth.

-- The solar wind is not disturbed as it approaches the Moon and therefore there are no charged particle layers around it similar to Earth's ionosphere.

-- Comparison of helium trapped in the solar wind striking the Moon's surface with helium trapped at various depths in returned surface material may improve understanding of the evolution of the Sun throughout the history of the solar system.

-- The laser reflector experiment enables scientists to improve knowledge of Earth-Moon distance to a precision of 15 to 30 centimeters or 5.8 to 11.7 inches. It also will increase knowledge of wobbles of Earth's axis, which is vital to understanding earthquakes.

The information has excited scientists who will continue to study it for many years. The Space Science Board of the National Academy of Science has stated, "The Apollo Missions do not simply represent the study of a specific small planet but rather form a keystone for a near-term understanding of planetary evolution."

Recently, when Alan Shepard was asked to comment on what he considered to be the significant achievements of manned space flight, he said, "I feel we have reached the payoff stage, the stage when the information we have learned in the early flights, the techniques we have used for putting man in space and using his abilities have reached fruition so that the public, the nation and the world can benefit from the tremendous technology."

# HISTORY OF U.S. MANNED SPACE FLIGHT

	Date	Flight Time (Hrs: Min: Sec)	Revo- lutions	Spacecraft Name	Remarks
<u>Mercury</u>					
Alan B. Shepard, Jr.	5/5/61	00:15:22	Sub- orbital	Freedom 7	America's first manned space flight.
Virgil I. Grissom	7/21/61	00:15:37	Sub- orbital	Liberty Bell 7	Evaluated spacecraft functions.
John H. Glenn, Jr.	2/20/62	04:55:23	3	Friendship 7	America's first manned orbital space flight.
M. Scott Carpenter	5/24/62	04:56:05	3	Aurora 7	Initiated research experiments to further future space efforts.
Walter M. Schirra, Jr.	10/3/62	09:13:11	6	Sigma 7	Developed techniques and procedures applicable to extended time in space.
L. Gordon Cooper, Jr.	5/15-16/63	34:19:49	22	Faith 7	Met the final objective of the Mercury program - spending one day in space.
<u>Gemini</u>					
Virgil I. Grissom John W. Young	3/23/65	04:52:31	3	Gemini 3	America's first two-man space flight.
James A. McDivitt Edward H. White, II	6/3-7/65	97:56:12	62	Gemini 4	First "walk in space" by an American astronaut. First extensive maneuver of spacecraft by pilot.
L. Gordon Cooper, Jr. Charles Conrad, Jr.	8/21-29/65	190:55:14	120	Gemini 5	Eight day flight proved man's capacity for sustained functioning in space environment.
Frank Borman James A. Lovell, Jr.	12/4-18/65	330:35:01	206	Gemini 7	World's longest manned orbital flight.
Walter M. Schirra, Jr. Thomas P. Stafford	12/15-16/65	25:51:24	16	Gemini 6A	World's first successful space rendezvous.
Neil A. Armstrong David R. Scott	3/16-17/66	10:41:26	6.5	Gemini 8	First docking of two vehicles in space.
Thomas P. Stafford Eugene A. Cernan	6/3-6/66	72:20:50	45	Gemini 9A	Three rendezvous of a spacecraft and a target vehicle. Extravehicular exercise - 2 hours 7 minutes.
John W. Young Michael Collins	7/18-21/66	70:46:39	43	Gemini 10	First use of target vehicle as source of propellant power after docking. New altitude record - 475 miles.
Charles Conrad, Jr. Richard F. Gordon, Jr.	9/12-15/66	71:17:08	44	Gemini 11	First rendezvous and docking in initial orbit. First multiple docking in space. First formation flight of two space vehicles joined by a tether. Highest manned orbit - apogee about 853 miles.
James A. Lovell, Jr. Edwin E. Aldrin, Jr.	11/11-15/66	94:34:31	59	Gemini 12	Astronaut walked and worked outside of orbiting spacecraft for more than 5½ hours - a record proving that a properly equipped and prepared man can function effectively outside of his space vehicle. First photograph of a solar eclipse from space.

	Date	Flight Time (Hrs: Min: Sec)	Revo- lutions	Spacecraft Name	Remarks
<u>Apollo</u>					
Walter H. Schirra Donn Eisele Walter Cunningham	10/11-22/68	260:8:45	163	Apollo 7	First manned Apollo flight demonstrated the spacecraft, crew and support elements. All performed as required.
Frank Borman James A. Lovell, Jr. William Anders	12/21-27/68	147:00:41	10 rev. of Moon	Apollo 8	History's first manned flight to the vicinity of another celestial body.
James A. McDivitt David R. Scott Russell L. Schweickart	3/3-13/69	241:00:53	151	Apollo 9	First all-up manned Apollo flight (with Saturn V and command, service, and lunar modules). First Apollo EVA. First docking of CSM with LM.
Thomas P. Stafford John W. Young Eugene A. Cernan	5/18-26/69	192:03:23	31 rev. of Moon	Apollo 10	Apollo LM descended to within 9 miles of Moon and later rejoined CSM. First rehearsal in lunar environment.
Neil A. Armstrong Michael Collins Edwin E. Aldrin, Jr.	7/16-24/69	195:18:35	30 rev. of Moon	Apollo 11	First landing of men on the Moon. Total stay time: 21 hrs., 36 min.
Charles Conrad, Jr. Richard F. Gordon, Jr. Alan L. Bean	11/14-24/69	244:36:25	45 rev. of Moon	Apollo 12	Second manned exploration of the Moon. Total stay time: 31 hrs. 31 min.
James A. Lovell, Jr. John L. Swigert, Jr. Fred W. Haise, Jr.	4/11-17/70	142:54:41	—	Apollo 13	Mission aborted because of service module oxygen tank failure.
Alan B. Shepard, Jr. Stuart A. Roosa Edgar D. Mitchell	1/31-2/9/71	216:01:59	34 rev. of Moon	Apollo 14	First manned landing in and exploration of lunar highlands. Total stay time: 33 hrs. 31 min.